

10/563335

IAP20 Rec'd PCT/PTO 30 DEC 2005

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No. : Confirmation No. :
First Named Inventor : Bernhard SCHENK
Filed : December 30, 2005
TC/A.U. :
Examiner :

Docket No. : 095309.57217US
Customer No. : 23911

Title : Hardtop Convertible Vehicle

SUBMISSION OF SUBSTITUTE SPECIFICATION

Mail Stop PCT
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

December 30, 2005

Sir:

Attached are a Substitute Specification and a marked-up copy of the original specification. I certify that said substitute specification contains no new matter and includes the changes indicated in the marked-up copy of the original specification.

Respectfully submitted,



Gary R. Edwards

Registration No. 31,824

CROWELL & MORING LLP
Intellectual Property Group
P.O. Box 14300
Washington, DC 20044-4300
Telephone No.: (202) 624-2500
Facsimile No.: (202) 628-8844
GRE:kms
2691903v1

HARDTOP CONVERTIBLE VEHICLE

BACKGROUND AND SUMMARY OF THE INVENTION

[0001] This application claims the priority of German patent document 103 29 439.2, filed July 1, 2003 (PCT International Application No. PCT/EP2004/006951, filed June 26, 2004), the disclosure of which is expressly incorporated by reference herein.

[0002] The present invention relates to a hardtop convertible vehicle.

[0003] A convertible of the generic type with a hardtop which has three roof parts, is disclosed for example in German patent document DE 101 33 957 A1. In the open roof (top down) position, the front roof part is stowed in the trunk of the vehicle, between the central and the rear roof parts. The front roof part is raised over the central roof part by means of a corresponding lever arrangement during a stowing movement.

[0004] German patent document DE 199 62 070 A1 discloses a similar arrangement, in which the front roof part is likewise raised over the central roof part. However, in the stowed state, the front roof part lies at the top.

[0005] German patent document DE 196 42 153 A1, on the other hand, describes a motor vehicle with a retractable roof which also has three roof parts. In this case, the front roof part is folded in an articulated manner and is stowed in the trunk between the central roof part and the rear roof part. A similar

folding-in of the front roof part is also described in German patent document DE 93 07 481 U1, but with the front roof part coming to lie right at the bottom.

[0006] German patent document DE 197 51 660 C1 discloses a device for stowing the roof construction of a hardtop vehicle, which includes a front roof part and a rear roof part. The rear roof part has a rear window that is pivoted relative to the rear roof part by means of a lever and a joint during the stowing movement of the two roof parts and is stowed in an opposed direction to the rear roof part. Rotation of the rear window in such a manner is also known from German patent document DE 198 07 490 C1. However, in the latter case, the rear window is merely rotated through an angle of approx. 15° and is therefore stowed essentially in the same direction as the rear roof part.

[0007] Finally, German patent document DE 101 16 709 A1 also discloses the movement of a rear window in relation to the rear roof part. However, in this case the rear roof part has an additional roof segment which likewise has to be pivoted, so that a very complicated construction and a correspondingly complicated stowing movement are required.

[0008] In all of the described roof systems with three roof parts, there is the fundamental problem that, in the open (top down) roof position, in which all of the roof parts are located in the trunk, the volume of space available in the trunk is substantially restricted.

[0009] It is therefore an object of the present invention to provide a convertible vehicle with a hardtop with at least three roof parts, in which the hardtop requires as little space as possible when stowed in the trunk.

[0010] This and other objects and advantages are achieved by the convertible top configuration according to the invention, in which the rear window is articulated in relation to the C-pillars. The resultant pivoting of the same, causes the rear window to assume a position in which it lies with its curvature in the same direction as that of the central roof part, achieving a considerable saving of space in the region between the C-pillars of the rear roof part. Thus, substantially more space is available for luggage when the roof is in the open (top down) position.

[0011] The volume of available trunk space in the open roof position is further increased by the fact that the front roof part is stowed in a very efficient manner, either along a backrest or along a motor vehicle tank, rather than with the rear and the central roof parts one above another. The result is therefore a convertible which provides its passengers with sufficient luggage space, even in the open state of the roof.

[0012] A particular advantage of the invention can be seen in its comparatively simple construction with a correspondingly uncomplicated configuration of the components.

[0013] Other objects, advantages and novel features of the present invention will become apparent from the following detailed description of the invention when considered in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0014] Figure 1 shows a first embodiment of the hardtop convertible according to the invention; and

[0015] Figure 2 shows a second embodiment of the hardtop convertible according to the invention.

DETAILED DESCRIPTION OF THE INVENTION

[0016] Fig. 1 shows a convertible 1 with a hardtop 2 which has three roof parts, including a front roof part 3, a central roof part 4 and a rear roof part 5. In this case, the rear roof part 5 comprises a rear window 6 and two C-pillars 7 of which just one can be seen in the side view of Fig. 1.

[0017] The hardtop 2 is illustrated in two positions in Fig. 1, namely in a closed roof position, in which the hardtop 2 and the roof parts 3, 4 and 5 extend from a windshield 8 to a trunk 9 which has a trunk lid 9a. The second position is assumed when the roof parts 3', 4' and 5' (designated by a "prime" mark) are located in the trunk 9, in the open roof (top down) position.

[0018] The roof parts 3, 4 and 5 are connected to one another in an articulated manner, and thus movement between the closed roof position and the open roof position is performed by a displacing device which is not illustrated but is known

per se. In the open roof position, the rear roof part 5' and the central roof part 4' come to lie one above the other, with the rear roof part 5' being arranged below the central roof part 4' in the present case.

[0019] The rear window 6 is mounted in an articulated manner in relation to the C-pillars, such that it is pivoted in relation to the C-pillars 7 during movement of the roof parts 3, 4 and 5 and, as indicated by the position of the rear window 6', comes to lie with its curvature in the same direction as the central roof part 4'. As a result, only the C-pillars 7' of the rear roof part 5' are located in a lower position. However, due to the position of the C-pillars 7' on the two sides of the trunk 9, only a very small amount of space is taken up within the trunk 9.

[0020] In order to be able to load as much luggage as possible into the trunk 9, in the embodiment according to Fig. 1, the front roof part 3' moves to a position along a backrest 10 of a rear seat bench 11 of the convertible 1, outside the arrangement of the rear roof part 5' with the central roof part 4'. The front roof part 3' is therefore located between the backrest 10 and a motor vehicle tank 12. Of course, the motor vehicle tank 12 may also be located at a different point within the convertible 1.

[0021] The embodiment of the hardtop 2 according to Fig. 2 is similar to that of Fig. 1, with the open roof position being indicated by a double prime mark. Thus, the rear roof part 5'', the central roof part 4'', the rear window 6'' and the C-pillars 7'' are located in the same position as in the case of Fig. 1. The front roof part 3'' again assumes a position outside the arrangement of the rear roof part 5'' with the central roof part 4'', but in this embodiment it lies along the

motor vehicle tank 12 and behind the same in the direction of travel. The shape of the motor vehicle tank 12 can be matched to the shape of the front roof part 3 in order to achieve a volume of the motor vehicle tank 12 which is as large as possible.

[0022] The displacing apparatus can have a plurality of rotary drives which are arranged in each case on the articulated connections between the roof parts 3, 4 and 5. This assists the exact stowing of the front roof part 3 into the intermediate space between the backrest 10 and the motor vehicle tank 12 in the case of Fig. 1 or along the motor vehicle tank 12 in the case of Fig. 2.

[0023] As an alternative, the displacing apparatus can have a driving device, such as, for example, an electric motor or a plurality of hydraulic cylinders, with the roof parts 3, 4 and 5 connected to one another via respective lever arrangements (not illustrated).

[0024] The two embodiments according to Figures 1 and 2 illustrate different vehicles 1. That is, for reasons of saving space, it is not anticipated to allow the driver of the convertible 1 to select whether he would like to stow the front roof part 3 along the backrest 10 or along the motor vehicle tank 12 when opening the hardtop 2.

[0025] The foregoing disclosure has been set forth merely to illustrate the invention and is not intended to be limiting. Since modifications of the disclosed embodiments incorporating the spirit and substance of the invention may occur

to persons skilled in the art, the invention should be construed to include everything within the scope of the appended claims and equivalents thereof.